UNITED STATES MARINE CORPS
COMBAT ENGINEER INSTRUCTION COMPANY
MARINE CORPS ENGINEER SCHOOL
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C-14A08
8 May 01
(00 POI)

STUDENT OUTLINE

DROP STANDING TIMBER

1. PURPOSE: The purpose of this period of instruction is to provide you with the knowledge needed to drop standing timber and operate the gasoline powered chain saw.

2. LEARNING OBJECTIVE (S):

a. TERMINAL LEARNING OBJECTIVE (S):

(1) Provided a mission, an area of standing timber, appropriate hand tools, chain saw, and references, demonstrate the techniques used to drop standing timber to meet mission requirements, without injury to personnel or damage to equipment, per the references. (1371.01.13)

(2) Provided a mission, an area of standing timber, appropriate hand tools, chain saw, and references, cut timber to size to meet mission requirements, utilizing proper tools, techniques, and procedures while observing safety precautions per the references. (1371.01.14)

b. ENABLING LEARNING OBJECTIVE (S):

(1) Without the aid of references, provided a mission to drop standing timber and a pioneer tool kit, select appropriate pioneer tools to satisfy the mission requirements per the references. (1371.01.13a)

(2) Without the aid of references, provided a mission, an area of standing timber and appropriate pioneer tools, demonstrate the techniques used to drop standing timber to meet mission requirements, without injury to personnel or damage to equipment per the references. (1371.01.13b)

(3) Without the aid of references, provided a mission to drop standing timber and an area of standing timber, state, orally, the factors that determine where a tree will fall per the references. (1371.01.13c)

(4) Without the aid of references, provided a chain saw, identify the components of the chain saw per the references. (1371.01.14d)

(5) Without the aid of references, provided a mission to drop standing timber, a chain saw, and safety devices, state, orally, safety procedures used while operating a chain saw per the references. (1371.01.15e)

(6) Without the aid of references, provided a chain saw, an SL-3 tool bag, fuel and oil, perform pre-operation check of the chain saw per the references. (1371.01.13f)

(7) Without the aid of references, while performing pre-operation check of the chain saw, state, orally, the procedure to adjust chain tension per the references. (1371.01.13g)

(8) Without the aid of references, while performing pre-operation check of the chain saw, state, orally, the procedure to check brake function per the references. (1371.01.13h)

(9) Without the aid of references, provided a chain saw, state, orally, the procedure to set the choke on the chain saw per the references. (1371.01.13i)

(10) Without the aid of references, provided a chain saw and safety devices, operate the chain saw without injury to personnel or damage to equipment per the references. (1371.01.13j)

(11) Without the aid of references, provided a mission, an area of standing timber and a chain saw, demonstrate the techniques used to drop standing timber to meet mission requirements, without injury to personnel or damage to equipment per the references. (1371.01.13k)

(12) Without the aid of references, provided pioneer tools and a piece of timber, as a member of a team, cut timber to size utilizing proper tools, techniques and procedures while observing safety precautions per the references. (1371.01.14a)

(13) Without the aid of references, provided a chain saw and a piece of timber, cut timber to size utilizing proper tools, techniques and procedures while observing safety precautions per the references. (1371.01.14b)

BODY

1. FUNDAMENTALS OF DROPPING STANDING TIMBER

a. Factors in dropping trees.

(1) Wind

(2) Natural lean

(3) Balance of the tree

(4) Whether the trunk is sound, hollow, or rotten

(5) Dead limbs

b. Direction of fall.

(1) Examine the tree location and decide which way it should be dropped.

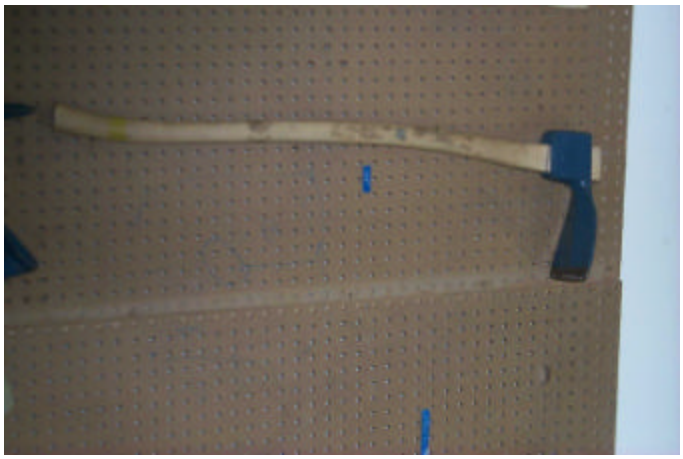
(2) If the tree lean is less than five degrees, it can be dropped in any direction.

(3) If the lean is more than five degrees, the tree can be dropped up to 45 degrees right or left of the lean.

(4) If possible, do not drop a tree uphill or into another tree it could result in injury.

(5) Once the direction of fall is determined, you should clear away all brush and low hanging branches. This can be accomplished by using the following land clearing tools that are located in the pioneer tool kit.

(a) ADZ (2 EA)



1 Description. The adz resembles an ax of which the edge of the blade is at a right angle to the handle. It has a curved (or arched) steel head, attached by its eye handle that is curved to give balance and to provide the proper angle for cutting.

2 Uses. The adz can be used like an ax for taking bark off trees and logs.

3 Maintenance and Care. Clean the adz by using an abrasive such as emery cloth steel wool or a steel brush if it becomes rusty. Keep the adz in the pioneer kit when not in use. Oil the head and paint the head with the exception of the cutting edge.

(b) Single Bit Ax (12 EA)

1 Description. The single bit ax has a 4 lb.. Head. The blade is 7 1/2 inches long, 4 3/4 inches wide, and has a tapered hammer side.

2 Uses. The single bit ax can be used for many different tasks, e.g., clearing small brush, clearing limbs off trees, felling trees, and driving wedges.

3 Maintenance and Care. Clean the ax with steel wool, emery cloth, or a steel brush. Check the wedges in the head and also check to see if the handle needs water soak to counter wood shrinkage. Sharpen the blade and remove any nicks then paint the head to prepare it for storage. Then store it with a light coat of oil to prevent rust.

(c) Bush Hook (2 EA)

1 Description. The bush hook is a strap-eye type of blade with an 11 3/4 inch long cutting edge connected to an ax type handle.

2 Uses. The bush hook is used to cut brush and briars.

3 Maintenance and Care. Use steel wool emery cloth or a steel brush to clean the brush hook and put it away with a light coat or oil. Also before storage check for nut and bolt tightness and blade to handle tightness.

(d) Rigid Handle Machete (6 EA)

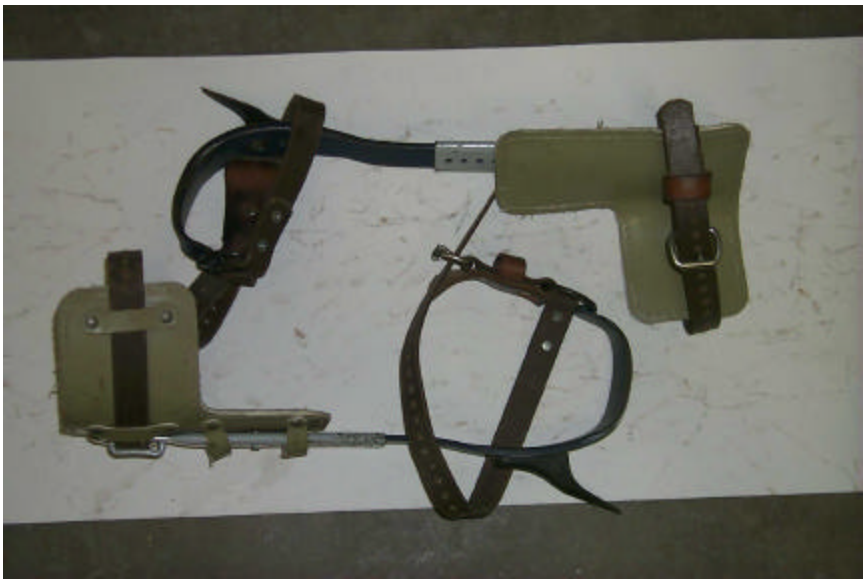
1 Description. The spring steel blade is 18 inches long, 2 1/4 inches wide with a 5 39/64 inch long handle, class I size.

2 Uses. To be used to cut small brush and limbs of trees while clearing land.

3 Maintenance and Care. Nicks and dulled cutting edge should be removed with rounded, smooth file, sharpening from both sides. Use steel wool to clean it and put a light coat of oil on it before storing.

(6) Situations may arise when it will be required to remove lower limbs that are out of normal safe operating distances. To accomplish this task the use of the tree/pole climbers set will be required.

(a) Tree and Pole Climber's Set (1 EA)



1 Description. The tree and pole climber's set have an adjustable support bar, 14'1/4" to 19'1/4" long, with pads and straps to connect to the climber's legs.

2 Uses. The climber's set is used to climb trees and poles.

3 Maintenance and Care. Use saddle soap to clean and lubricate the pads and straps, and use steel wool to clean the set of climbers. Put away with a light coat of oil.

b. Industrial Safety Strap (1 EA)

1 Description. It is 70 inches long, 2 inches wide, and has hooks on each end that snaps onto the safety belt.

2 Uses. To fit around a tree or pole to stabilize a person while he performs whatever work is necessary.

3 Maintenance and Care. Use saddle soap to clean and lubricate the pads and straps, and use steel wool to clean the set of climbers. Put away with a light coat of oil.

c. Industrial Safety Belt (1 EA)

1 Description. The safety belt is an adjustable leather belt that has loops in which to carry tools. It also has two D rings fastened to it for holding the safety strap. The safety strap is a leather strap with metal snap links on each end, for hooking into the D ring of the safety belt.

2 Uses. To carry tools and hook on to the safety strap.

3 Maintenance and Care. Keep leather items soft and supple by occasionally applying foot oil. Also examine all stitching frequently and repair immediately if needed. Always inspect D ring on the safety belt and snap-hooks of the safety strap frequently.

2. CHAIN SAW.

a. GENERAL COMPONENTS.

(1) Oilamatic chain: A loop of chain having cutters, tie straps, and drive links.

(2) Guide Bar: Supports and guides the saw chain.

(3) Guide Bar Nose: The exposed end of the guide bar.

(4) Bumper Spike: Toothed stops for holding saw steady against wood.

(5) Chain Brake: A device to stop the rotation of the chain if activated in kickback situation by the operator's hand or by inertia.

(6) Front Handle: Handle bar for the left hand at front of saw.

(7) Front Hand Guard: Provides protection against protruding branches and helps prevent the left hand from touching the chain, if it slips off the handle bar.

(8) Spark Plug Terminal: Connects the spark plug with the ignition wire.

(9) Twist Lock: Lock for carburetor box cover.

(10) Rear Handle: The support handle for the right hand, located at or toward the rear of the saw.

(11) Rear Hand Guard: Gives added protection to operator's hand.

(12) Chain tension adjustment screw: Permits precise adjustment of chain tension.

(13) Chain Catcher: Helps reduce the risk of operator contact by a chain when it breaks or comes off the bar.

(14) Chain Sprocket: The toothed wheel that drives the saw chain.

(15) Chain Sprocket Cover: Covers the clutch and the sprocket.

(16) Master Control Lever: Lever for choke control, starting throttle, run and stop switch position.

(17) Throttle Trigger Interlock: Must be depressed before the throttle trigger can be activated.

(18) Throttle Trigger: Located on the rear handle. Controls the speed of the engine.

(19) Chain Guard (Scabbard): Covers the bar and the chain when the saw is not in use.

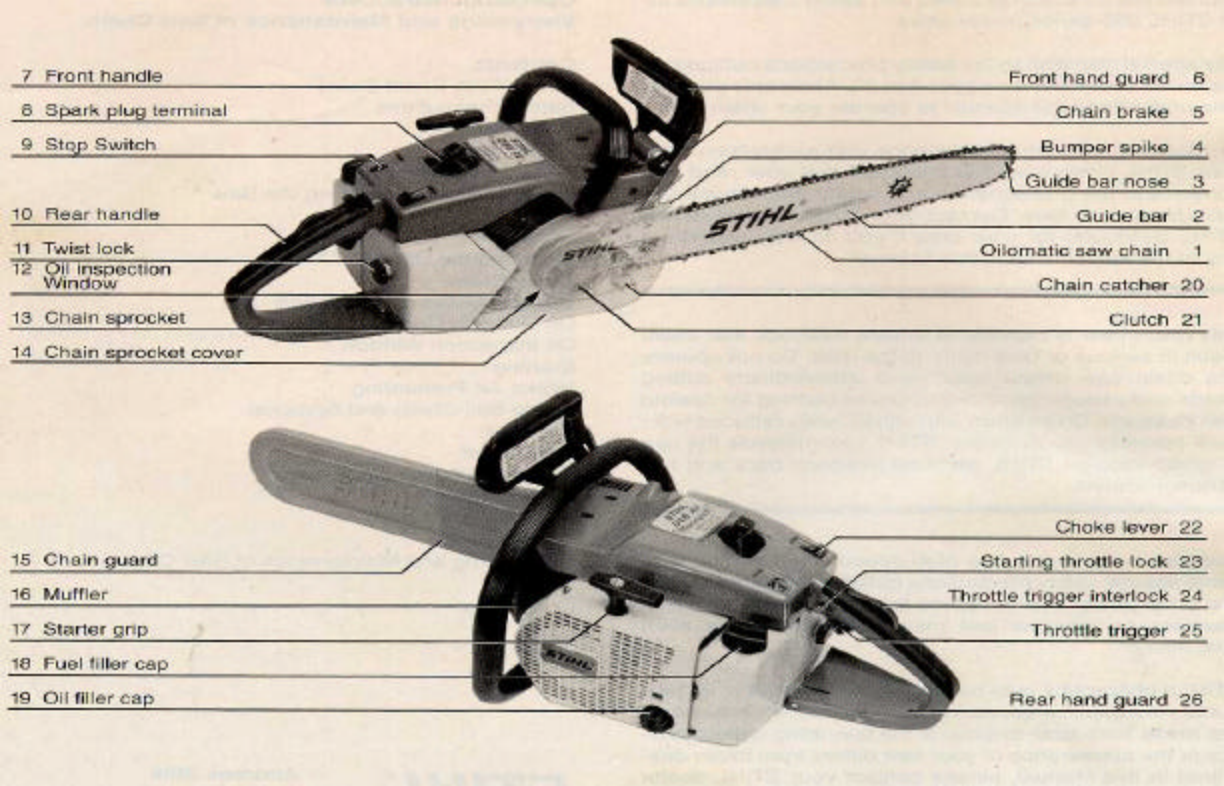
(20) Muffler: Reduces engine exhausts noise and directs the exhaust gases.

(21) Starter Grip: The grip of the starter for starting the engine.

(22) Oil Filler Cap: For closing the oil tank.

(23) Fuel Filler Cap: For closing the fuel tank.

(24) Handle Heating Switch: For switching the electric handle heating on and off. (Not used by the Marine Corps)



b. FUEL REQUIREMENTS.

(1) Use unleaded 87 octane or higher gasoline with which many types of oil can be mixed.

(2) If possible use a high quality two cycle motor oil. Approximately 3.2 ounces of two cycle oil per gallon of gas. Two-cycle oil is sometimes dispensed in individual containers specifically designed for one gallon of gas. If two-cycle oil is not available, SAE 30 wt. or SAE 40 wt. can be used in the mix.

(3) When using 40 wt. or heavier oil, mix one part oil with 32 parts gasoline (32:l).

(4) When using 30-wt. oil, mix one part oil with 16 parts gasoline (16:1).

(5) Mix ratio table:

Gasoline	32:1 (SAE 40 or heavier)	16:1 (SAE 30)
1 gallon	1/4 pint	1/2 pint
2 gallons	1/2 pint	1 pint
3 gallons	3/4 pint	1 1/2 pints
4 gallons	1 pint	2 pints
5 gallons	1 1/4 pints	2 1/2 pints

(6) Measure the exact amounts of oil and gasoline required and pour into a clean safety approved fuel can.

(7) Never mix fuel and oil directly in the gas tank on the saw.

c. CHAIN OIL REQUIREMENTS.

(1) Chain oil for 50-104 degrees use 30 wt.

(a) 14- 49 degrees use 20 wt.

(b) 13 degrees or less use 10 wt.

(2) On chain saws with an automatic oilier, fill the chain oil reservoir every time the engine is fueled.

(3) On chain saws with a manual oilier, fill the chain oil reservoir every time the engine is fueled also, but you must check it frequently, especially when the manual oilier is used extensively.

d. GENERAL PRE-OPERATION INSPECTION.

(1) Clear the area of any possible hazards.

(2) Check fuel level and chain oil level visually.

(3) Check the chain to ensure that it is on the sprocket assembly at the back of the saw. Make sure that there are no kinks and ensure that it is set in the bar properly. The chain should have all the teeth on the top of the bar facing toward the nose of the bar.

(4) Check the bar at the rear of the saw to ensure that the slot on the bar is seated on the adjustment notch under the sprocket cover. Also check the track of the bar to ensure that it is not bent and has no obstructions in it.

(5) Adjust the chain tension. Adjusting the chain tension will vary from saw to saw. On the majority of chain saws, you first have to loosen the sprocket cover and find the adjustment screw, which is usually located on the side of the chain saw towards the front of the saw to the left of the bar. Insert a screwdriver to the adjustment screw. Turn the screw clockwise until the chain is tight enough to, where it can only be pulled high enough off the bar to fit a dime between the chain and the bar. If the chain is stretched to where it will not tighten to the proper tension, do not use the chain. In this circumstance, the chain must be shortened by personnel qualified to perform this task or a new chain will be used.

(6) Pull out the starting cord and check for a worn or broken cord.

(7) Check the choke if that model has a choke. Some chain saws have warm and cold start. Pull it out to ensure that it works.

(8) Check the trigger. The trigger ensures that gas goes to the engine.

(9) Put on safety equipment.

(10) Engage the chain brake.

e. STARTING AND OPERATING THE CHAIN SAW.

(1) Keep left arm on the front handle in a locked (straight) position.

(2) Starting on ground level, hold the saw firmly on the ground with your left hand on the handlebar, and place your right foot on the rear of the handle and press down.

(3) Pull the starter grip slowly with your right hand until you feel the starter engage, then give the grip a brisk strong pull. The starter rope must not be pulled out more than 70 cm (about 28 in) as it might otherwise break. Do not let the starter grip snap back. Guide it slowly into the housing so that the starter rope can rewind properly.

(4) Repeat step (c) until it begins to run. If starting from cold, set the choke to open position prior to cranking.

(5) As soon as the engine is running, immediately squeeze the throttle trigger to disengage it from the starting throttle position. The Master Control lever moves from the start position to its normal operating position and the engine runs at idle speed. Damage may be caused to the clutch if the engine is not immediately returned to idle speed.

(6) Disengage the chain brake before starting work by pulling the hand guard back toward the handlebar.

(7) Stop the engine by moving the Master Control lever to "STOP".

f. SAFETY PRECAUTIONS UNIVERSAL TO GASOLINE POWERED CHAIN SAWS.

(1) While in the Marine Corps you will come in contact with a wide variety of chain saws, ranging from Poulans to Stihls. All of these chain saws have different safety features and functions, but a majority of these features and functions remain universal. Prior to operating any chain saw, always read the operator's manual. The manual will cover any specifics concerning that particular chain saw.

(2) Do not operate a chain saw when you are fatigued. **BE ALERT** tiredness may result in loss of control and an accident.

(3) Wear proper clothing: Avoid loose-fitting jackets, scarves, neckties, jewelry or anything that could become entangled with the chain or material cutting. Always wear gloves, goggles, and hearing protection.

(4) Never modify a chain saw in any way.

(5) Always set the saw on the deck, engage the brake, and stop the engine. Remember - DECK, BRAKE, OFF.

(6) Avoid touching the hot muffler!

(7) Always make sure the hex nuts, for the sprocket cover, are tightened securely during operation and after tightening the chain. Inspect frequently as they may vibrate loose.

(8) Never start the saw with the sprocket cover loose. If it loosens while cutting, shut off the engine and tighten.

(9) Never try to tighten the chain while the engine is running.

(10) Fueling: Do not smoke or bring any fire or flame near the fuel. Fuel the chain saw outdoors only. Always shut off the engine and allow it to cool before refueling. Tighten the fuel cap after filling to avoid spilling and risk of fire.

(11) Do not drop start: This method is very dangerous because you may lose control of the saw when starting. Place the saw on firm ground or other solid surface, in an open area.

(12) Do not use a saw with incorrect idle speed adjustment. At correct idle speed, the chain should not rotate.

(13) Always hold the chain saw firmly with both hands when the engine is running.

(14) Do not operate the chain saw with the starting throttle lock engaged. This will not permit the operator proper control of the saw or chain speed.

(15) Do not cut any material other than wood.

(16) In order to keep control of your saw, always maintain a firm foothold. **Never** work on a ladder, in a tree or on any other unsecured support.

(17) **Never** use the saw above shoulder height.

(18) Avoid kickback. Kickback occurs when the upper quadrant of the bar nose contacts a solid object or is pinched. This may fling the bar up and back in an uncontrolled arc. Under some circumstances the bar moves towards the operator, who may suffer severe or fatal injury. To avoid kickback:

(a) Hold the chain saw **firmly** with both hands.

(b) Be aware of the location of the guide bar nose at all times.

(c) Never let the nose of the guide bar come in contact with any object, or cut limbs with the nose of the guide bar. Be especially careful when cutting small, tough limbs, small size brush and saplings that may easily catch the chain.

(d) Don't over reach. Don't cut above shoulder height.

(e) Begin cutting and continue at full throttle.

(f) Cut only one log at a time.

(g) Use extreme caution when reentering a previous cut.

(h) Be alert of shifting of the log or other forces that may cause the cut to close and pinch the chain.

(i) Cut with a correctly sharpened, properly tensioned chain at all times.

(j) Stand to the side of the cutting path of the chain saw.

(k) Pull-in occurs when the chain on the bottom of the bar is suddenly stopped. The reaction of the chain pulls the saw forward and may cause the operator to lose control. Pull-in frequently occurs when the bumper spike of the saw is not held securely against the tree or limb and when the chain is not rotating at full speed before it enters the wood. To avoid pull-in:

(l) Always start a cut with the chain at full speed and the bumper spike in contact with the wood.

(m) Use wedges to open the cut.

3. DROP STANDING TIMBER

a. There are three basic cuts involved in dropping standing timber. They are the under cut, notch cut and back cut. These cuts must be performed correctly and in proper sequence to ensure mission accomplishment and safety.

(1) Under cut.

(a) Make an undercut to provide a hinge point to tip the tree on its stump. The undercut is a notch cut into the tree.

(b) Make the undercut on the side of the tree towards the direction of fall.

(c) Make it approximately 12" above the ground and cut into the tree 1/4 of its diameter.

(2) Notch cut.

(a) Make the next cut above the first at a 45 degree angle that will intersect with the first, thus making a notch (wedge shape).

(b) A correct notch should be straight to the direction of the fall.

(3) Back cut.

(a) Make the back cut two inches higher than the bottom of the undercut on the opposite side.

(b) Make the cut parallel to the undercut, until two or three inches of holding wood is left.

(c) Do not cut through to the undercut or the saw may be kicked back when the tree falls. This is very dangerous.

(4) Use wedges (plastic or steel) behind the saw to help tip the tree over.

b. Irregular tree conditions.

(1) Leaning trees.

(a) Leaning trees can be made to fall in a direction different from the lean.

(b) One method is to use a holding corner. This is done by leaving more wood on the side opposite of the lean.

(c) Timber wedges can also alter the fall.

1 Description. The timber wedge is a steel tool, one end of the wedge is slightly fan shaped and sharpened to a dull edge. The other is

squared off to furnish a flat surface which a sledge can strike when driving the wedge into the log.

2 Uses. Used with a sledge, primarily to split logs and timber. When sawing timber or thick lumber, it may be used to spread the kerf or sawed cut so the saw will not bind.

3 Maintenance and Care. File the chisel end to keep sharp and use a light coat of oil before storage.

(d) Wind can help in dropping a tree in the desired direction.

(e) The tree can be pushed by hand, a large pole, or by a tractor.

(f) The tree can be pulled using chain or rope and a working party, a winch, or a tractor. Personnel must utilize caution!

1 Fiber rope description. 3 Strand, twisted right/left lay, mildew resistant. Unit of issue 300’ coils.

a Unit of issue.

(1) Rope 1.5 inches circumference, 2650 lb. min breaking strength.

(2) Rope 2.25 inches circumference, 5400 lb. min breaking strength.

(3) Rope 3 inches circumference, 9000 lb. min breaking strength.

b Types of rope. Manila, Sisala, Nylon

c Uses. Used with block and tackle set for heavy lifting.

d Maintenance and care. Store in a cool dry place keep clean, dirt free and dry when not in use. Rope management is a necessity.

2 Chain Assembly description. Single leg, open linked chain, welded with 4 inch ring at one end and a grab hook at the other; 14 feet long with 20,000 lb. breaking strength.

a Uses. To move or tie down heavy objects

b Maintenance and Care. Apply a light coat of oil and store in tool box when not in use.

(g) To drop a tree in direction of lean, you should cut 3/4 through the tree, using wedges to keep from pinching the saw. Then cut the back cut.

(2) Rotten trees:

(a) Cut high enough to avoid most of the rot.

(b) If the butt of the tree is badly decayed, chop it down with an ax to expose solid wood before using the chainsaw.

c. DRESSING TIMBER

(1) Limb the tree. Limbing is removing the limbs from the log.

(a) Cut from the base to the top of the tree.

(b) Cut from the opposite side of the tree from which you are standing when possible.

(c) Cut the limb even with the bark.

(d) If a pinch occurs, stop the engine and remove the saw, by lifting the limb.

(e) Use teamwork to avoid pinching the bar!

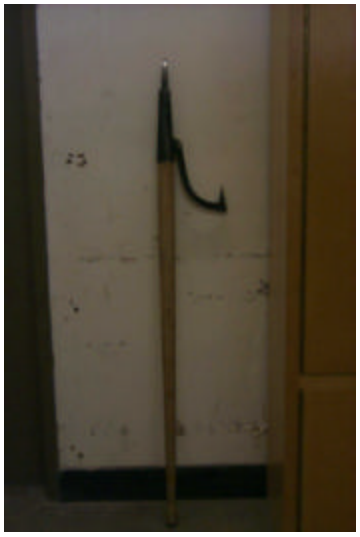
(f) Once the de-limbing process has been completed it may be necessary to strip the outer bark away from the timber in order to simplify processing. The proper tool for this operation is the adz.

(2) Bucking the tree. Bucking is cutting the limbed trees into desired log lengths.

(a) Be sure to watch for binding and kickback of the saw.

(b) If the saw pinches, stop the engine and remove it from the log. If the bind is severe the use of the peavey might be necessary to un-wedge the bar of the chainsaw.

1 Peavey description. The peavey has a hook, ½″ x 1″ and 10 ½″ long and a 54 inch long handle.



2 Uses. To move logs and small trees during timber operations.

3 Maintenance and Care. Lightly oil all metal parts and lightly linseed oil the wooden handle.

(c) Cut the log in desired lengths usually eight to sixteen feet. In order to transport the timber sections away from the area of operation timber carriers will have to be used.

1 Timber Carrier

(a) Description. The timber carrier has a four foot handle with a set of chisel bill hooks in the center. This tool requires two men to a carrier.

(b) Uses. Designed to assist in carrying timber and logs.

(c) Maintenance and Care. Use a steel brush to clean the carrier then put a light coat of oil on the hooks. Put linseed oil on the handle to prevent the wood from drying out.

(d) Allow two to four inches for trimming of the ends.

REFERENCES

1. 365 Husqvarna Operators Manual

2. TM 5-461 Engineer tools

3. 056 Stihl Operators Manual